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APPLICATION NO	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO	CONFIRMATION NO
09/614,649	07/12/2000	Pierre J. Arquin	SASIP022A	2141

25696 7590 07/03/2002

OPPENHEIMER WOLFF & DONNELLY
P. O. BOX 10356
PALO ALTO, CA 94303

EXAMINER
GREENE, JASON M

ART UNIT	PAPER NUMBER
1724	8

DATE MAILED: 07/03/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

Application No.	Applicant(s)
09/614,649	ARQUIN ET AL.
Examiner	**Art Unit**
Jason M. Greene	1724

Office Action Summary

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *01 April 2002*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☐ Claim(s) _____ is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-29 and 31-49* is/are rejected.

7)☒ Claim(s) *35* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *12 July 2000* is/are: a)☐ accepted or b)☒ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1☐ Certified copies of the priority documents have been received.

2☐ Certified copies of the priority documents have been received in Application No. _____.

3☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

[illegible] under 35 U.S.C. § 119(e) (to a provisional application)

Attachment(s)

1)☒ Notice of References Cited (PTO-892)

2)☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3)☐ [illegible] Summary (PTO-413) Paper No(s).

4)☐ Notice of Informal Patent Application (PTO-152)

DETAILED ACTION

Drawings

1. This application has been filed with informal drawings which are acceptable for examination purposes only. Formal drawings will be required when the application is allowed.

2. The drawings are objected to because the reference characters 100, 202, 210, 302, and 303 in Fig. 1 are enclosed within outlines, e.g. encircled, and are not oriented in the same direction as the view. See 37 CFR 1.84(p)(1). Correction is required.

3. The drawings are objected to because the view numbers are not preceded by the abbreviation "FIG.". See 37 CFR 1.84(u)(1). Correction is required.

4. The drawings are objected to because the numbers used for reference characters 202, 210, 302, and 303 are larger than the number used for view 1. See 37 CFR 1.84(u)(2). Correction is required.

Response to Amendment

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5. Applicant's claim for domestic priority under 35 U.S.C. 119(e) is acknowledged. However, the provisional application upon which priority is claimed fails to provide adequate support under 35 U.S.C. 112 for claims 11-29, 31-45, 47, or 49 of this application.

With regard to claims 11-20, 47, and 49, Provisional Application 60/143,377 does not disclose the step of shutting down the flow of gas if the temperature of said hydrogen sponge exceeds an alarm temperature. While the provisional application does teach monitoring the of temperature the hydrogen sponge (304) using a thermocouple (305) in Fig. 3 and page 10, lines 12-18 of the specification, there is no disclosure of shutting down the flow of gas if the temperature of said hydrogen sponge exceeds an alarm temperature.

With regard to claims 21-29, 31-34, 36, and 37-45, the provisional application does not disclose the temperature sensor being placed within a melt zone. While the provisional application does teach disposing a thermocouple (305) in first portion of the purification material (304) at a distance below the top of said first portion of the purification material, in Fig. 3 and page 10, lines 12-18 of the specification, there is no disclosure of the temperature sensor being placed within a melt zone of the purification

With regard to claim 35, the provisional application does not disclose determining a melt zone based on either a flow rate of said gas or an age of said gas purification material or a combination thereof, or placing the temperature sensor within the melt zone.

Response to Arguments

6. Applicant's arguments filed 01 April 2002 have been fully considered but they are not persuasive.

With regard to Applicants' argument that Snow et al. does not disclose the gas purification system of claim 48, the Examiner contends that Snow et al. teaches the claimed gas purification system being well known in col. 2, lines 3-53.

7. Applicant's arguments with respect to claims 1-29, 31-47, and 49 have been considered but are moot in view of the new ground(s) of rejection.

Claim Objections

8. Claim 35 objected to because of the following informalities: The word "with" in line 12 should be changed to "within". Appropriate correction is required.

Claim Rejections - 35 USC § 112

9. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

10. Claim 35 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

11. Claim 35 recites the limitation "said distance" in line 10. There is insufficient antecedent basis for this limitation in the claim.

Claim Rejections - 35 USC § 102

12. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

13. Claim 48 is rejected under 35 U.S.C. 102(b) as being anticipated by Snow et al.

Snow et al. teaches a gas purification providing hydrogen sorption and particulate filtering comprising a hydrogen sponge including hydrogen sorption material, a particulate filtering device, and an enclosure having an inlet and an outlet, said

hydrogen sponge and said particulate filter device arranged within said enclosure such

that a gas flowing into said enclosure via said inlet and out of said enclosure via said outlet must follow a flow path first contacting said hydrogen sorption material and then flowing through the particulate filtering device being well known in col. 2, line 3 to col. 3, line 19.

Claim Rejections - 35 USC § 103

14. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

15. Claims 1, 2, 4, 8, and 9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Snow et al. in view of Briesacher et al.

With regard to claim 1, Snow et al. teaches a gas purification system providing hydrogen sorption and particulate filtering comprising a hydrogen sponge including hydrogen sorption material, a particulate filtering device, and an enclosure having an inlet and an outlet, said enclosure housing said hydrogen sponge and said particulate filter device, said hydrogen sponge proximal to said inlet, said filter device proximal to said outlet, said hydrogen sponge and said particulate filter device arranged within said enclosure such that a gas flowing into said enclosure via said inlet and out of said

material and then flowing through the particulate filtering device being well known in col. 2, line 3 to col. 3, line 19.

Snow et al. does not disclose the hydrogen sorption material being thermally regenerated by heating said enclosure.

Briesacher et al. discloses thermally regenerating a hydrogen sorption material by heating an enclosure housing the hydrogen sorption material in col. 7, lines 35-47.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the regeneration of Briesacher et al. into the gas purification system of Snow et al. to allow the hydrogen sorption material to be reused to reduce operating costs.

With regard to claims 2 and 4, Snow et al. discloses the particulate filtering device being manufactured from sintered nickel in col. 2, lines 3-28.

With regard to claim 8, Snow et al. discloses the hydrogen sorption material being an alloy of zirconium, nickel, and titanium in col. 3, lines 1-2.

With regard to claim 9, Snow et al. discloses the hydrogen sorption material being a non-evaporative getter alloy of zirconium-vanadium-iron in col. 2, line 54 to col. 3, line 5.

16. Claims 3, 5, and 7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Snow et al. and Briesacher et al. as applied to claim 1 above, and further in view of Davis.

With regard to claim 3, Snow et al. does not explicitly disclose the particle filtering device being substantially capable of removing particles from the outlet gas flow as small as 0.003 micron.

Davis discloses a similar particle filtering device capable of removing 99.999999 percent of particles having a diameter of 0.1 micron in col. 4, line 23 to col. 5, line 25.

Since the particulate filter device of Davis is capable of removing 99.9999999 percent of particles having a diameter of 0.1 micron, one of ordinary skill in the art at the time the invention was made would have expected the particle filtering device of Davis to be at least capable of removing some particles from the outlet gas flow as small as 0.003 micron.

Furthermore, Davis teaches varying the diameter of the sintered together particles to adjust the collection efficiency of the particle filtering device in col. 5, lines 39-40.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to adjust the diameter of the sintered together particles of Davis to allow the particle filtering device to be used to collect particles having a smaller

It would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the particle filtering device of Davis into the gas purification system of Snow et al. and Briesacher et al. to provide a high efficiency particle filtering device capable of withstanding high operating temperatures.

With regard to claim 5, Snow et al. and Briesacher et al. do not disclose the particulate filtering device being comprised of a plurality of filtering elements.

Davis discloses the particulate filtering device being comprised of a plurality of filtering elements in col. 4, lines 7-14.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the plurality of filtering elements of Davis into the gas purification system of Snow et al. and Briesacher et al. to provide the desired efficiency, as suggested by Davis in col. 4, lines 7-12.

Furthermore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to duplicate the downstream filtering device of Snow et al. in that duplicating parts for a multiplied effect is merely a choice of design. See St. Regis Paper Co. v. Bemis Co., Inc., 193 USPQ 8, 11.

With regard to claim 7, Snow et al. and Briesacher et al. do not explicitly disclose the filtering element being a disk shape.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the disk shaped filter element of Davis into the gas purification system of Snow et al. and Briesacher et al. to allow the filter elements to be economically housed within a standard cylindrical enclosure.

17. Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over Snow et al., Briesacher et al., and Davis as applied to claim 5 above, and further in view of Whitlock et al.

Snow et al., Briesacher et al., and Davis do not disclose the filtering element having a conical shape.

Whitlock discloses a similar sintered metal filter having a conical shape in col. 2, line 66 to col. 3, line 11.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the conical filter shape of Whitlock et al. into the system of Snow et al., Briesacher et al., and Davis to increase the surface area of the filter available to the gas stream, as is well known in the art.

Furthermore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to change the shape of the filter element of Snow et al., Briesacher et al., and Davis in that such is merely a choice of design. See In re Dailey et al., 149 USPQ 47.

18. Claims 10 and 46 are rejected under 35 U.S.C. 103(a) as being unpatentable over Snow et al. and Briesacher et al. as applied to claim 1 above, and further in view of Bourne et al.

Snow et al. and Briesacher et al. do not disclose the gas purification system further comprising a temperature measuring device, the temperature measuring device being placed within the hydrogen sorption material.

Bourne et al. discloses using a temperature measuring device to measure the temperature inside a hydrogen sorption material in col. 6, lines 37-45.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the temperature measuring device of Bourne et al. into the system of Snow et al. and Briesacher et al. to allow the temperature of the getter material to be controlled, as suggested by Bourne et al. in col. 6, lines 37-45.

19. Claims 11, 12, 14, 18, 19, and 47 are rejected under 35 U.S.C. 103(a) as being unpatentable over Snow et al. in view of Boffito et al. and WO 99/19048.

With regard to claim 11, Snow et al. discloses a method for purifying a gas suitable for purifying a gas to a level of purity sufficient for semiconductor manufacturi9ng, the method comprising the acts of flowing a gas under pressure into a gas purification system enclosure via an inlet, contacting said gas under pressure with a

enclosure, and flowing said gas out of said gas purification system enclosure via an outlet in col. 2, line 3 to col. 3, line 19.

Snow et al. does not disclose the method including cooling a gas to room temperature or monitoring the temperature of the hydrogen sponge, wherein the flowing is shut down if the temperature of said hydrogen sponge exceeds an alarm temperature.

Boffito et al. discloses a hydrogen sponge that can adsorb hydrogen at 25 ^{O}C in col. 6, lines 29-37.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the room temperature operation and corresponding required cooling of Boffito et al. into the method of Snow et al. to prevent the hydrogen sponge from releasing hydrogen as water is adsorbed, as suggested by Boffito et al. in col. 5, line 3 to col. 7, line 55.

Since the prior art is seen as disclosing a specific example of the temperature lying within the claimed range of less than 100 ^{O}C, this limitation is anticipated.

WO 99/19048 discloses monitoring the temperature of the hydrogen sponge, wherein the flowing is shut down if the temperature of said hydrogen sponge exceeds an alarm temperature in page 1, line 22 to page 4, line 10.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the temperature monitoring and flow control of WO

reactive impurities from entering the hydrogen sponge, as suggested by WO 99/19048 in page 1, line 22 to page 4, line 10.

With regard to claims 12 and 14, Snow et al. discloses the particulate filtering device being manufactured from sintered nickel in col. 2, lines 3-28.

With regard to claim 18, Snow et al. discloses the hydrogen sorption material being an alloy of zirconium, nickel, and titanium in col. 3, lines 1-2.

With regard to claim 19, Snow et al. discloses the hydrogen sorption material being a non-evaporative getter alloy of zirconium-vanadium-iron in col. 2, line 54 to col. 3, line 5.

With regard to claim 47, WO 99/19048 discloses the alarm temperature being 10 ^{0}C to 100 ^{0}C above the operating temperature in page 13, lines 21-29.

Since the operating temperature is seen as being 25 ^{0}C, the alarm temperature is seen as being 35 ^{0}C to 125 ^{0}C.

Since the claimed range is seen as lying with the prior art range, a prima facie case of obviousness exists which must be overcome through a showing of unexpected or unobvious results.

20. Claims 13, 15, and 17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Snow et al., Boffito et al., and WO 99/19048 as applied to claim 11 above, and further in view of Davis.

With regard to claim 13, Snow et al., Boffito et al., and WO 99/19048 do not explicitly disclose the particle filtering device being substantially capable of removing particles from the outlet gas flow as small as 0.003 micron.

Davis discloses a similar particle filtering device capable of removing 99.999999 percent of particles having a diameter of 0.1 micron in col. 4, line 23 to col. 5, line 25.

Since the particulate filter device of Davis is capable of removing 99.9999999 percent of particles having a diameter of 0.1 micron, one of ordinary skill in the art at the time the invention was made would have expected the particle filtering device of Davis to be at least capable of removing some particles from the outlet gas flow as small as 0.003 micron.

Furthermore, Davis teaches varying the diameter of the sintered together particles to adjust the collection efficiency of the particle filtering device in col. 5, lines 39-40.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to adjust the diameter of the sintered together particles of Davis to allow the particle filtering device to be used to collect particles having a smaller

It would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the particle filtering device of Davis into the gas purification method of Snow et al., Boffito et al., and WO 99/19048 to provide a high efficiency particle filtering device capable of withstanding high operating temperatures.

With regard to claim 15, Snow et al., Boffito et al., and WO 99/19048 do not disclose the particulate filtering device being comprised of a plurality of filtering elements.

Davis discloses the particulate filtering device being comprised of a plurality of filtering elements in col. 4, lines 7-14.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the plurality of filtering elements of Davis into the gas purification method of Snow et al., Boffito et al., and WO 99/19048 to provide the desired efficiency, as suggested by Davis in col. 4, lines 7-12.

Furthermore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to duplicate the downstream filtering device of Snow et al. in that duplicating parts for a multiplied effect is merely a choice of design. See St. Regis Paper Co. v. Bemis Co., Inc., 193 USPQ 8, 11.

With regard to claim 17, Snow et al., Boffito et al., and WO 99/19048 do not

It would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the disk shaped filter element of Davis into the gas purification method of Snow et al., Boffito et al., and WO 99/19048 to allow the filter elements to be economically housed within a standard cylindrical enclosure.

21. Claim 16 is rejected under 35 U.S.C. 103(a) as being unpatentable over Snow et al., Boffito et al., WO 99/19048, and Davis as applied to claim 15 above, and further in view of Whitlock et al.

Snow et al., Boffito et al., WO 99/19048, and Davis do not disclose the filtering element having a cylindrical shape.

Whitlock discloses a similar sintered metal filter having a cylindrical shape in col. 2, line 66 to col. 3, line 11.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the conical filter shape of Whitlock et al. into the method of Snow et al., Boffito et al., WO 99/19048, and Davis to increase the surface area of the filter available to the gas stream, as is well known in the art.

Furthermore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to change the shape of the filter element of Snow et al., Boffito et al., WO 99/19048, and Davis in that such is merely a choice of design. See In re Dailey et al., 149 USPQ 47.

22. Claim 20 is rejected under 35 U.S.C. 103(a) as being unpatentable over Snow et al., Boffito et al., and WO 99/19048 as applied to claim 11 above, and further in view of Bourne et al.

Snow et al., Boffito et al., and WO 99/19048 do not disclose the gas purification method further comprising monitoring the temperature of the hydrogen sorption material.

Bourne et al. discloses using a temperature measuring device to measure the temperature inside a gas sorption material in col. 6, lines 37-45.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the temperature measuring step of Bourne et al. into the method of Snow et al., Boffito et al., and WO 99/19048 to allow the temperature of the getter material to be controlled, as suggested by Bourne et al. in col. 6, lines 37-45.

23. Claim 49 is rejected under 35 U.S.C. 103(a) as being unpatentable over Snow et al., Boffito et al., and WO 99/19048 as applied to claim 11 above, and further in view of Briesacher et al.

Snow et al., Boffito et al., and WO 99/19048 do not disclose thermally regenerating said hydrogen sponge by heating said hydrogen sponge to a temperature of approximately 200 degrees Celsius.

Briesacher et al. discloses thermally regenerating a hydrogen sorption material

It would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the regeneration of Briesacher et al. into the gas purification method of Snow et al., Boffito et al., and WO 99/19048 to allow the hydrogen sorption material to be reused to reduce operating costs.

24. Claims 21, 28, 29, 31, and 39-45 are rejected under 35 U.S.C. 103(a) as being unpatentable over UK Patent Application GB 2 177 079 A in view of WO 99/19048.

With regard to claim 21, UK Patent Application GB 2 177 079 A discloses a heated getter vessel comprising a gas heating device (6, top of 3,16), a quantity of gas purification material (4), a quantity of barrier material (15), an enclosure (3,14) having an inlet (1) and an outlet (2), said enclosure housing said gas purification material and said gas heating device, said gas heating device proximal to the inlet, said barrier material proximal to the outlet, said gas purification material disposed between said gas heating device and said barrier material, said gas heating device, gas purification material, and said barrier material arranged within said enclosure such that a gas flowing into said enclosure via said inlet and out of said enclosure via said outlet must follow a flow path first through said gas heating device then contacting said gas purification material then flowing through said barrier material in Fig. 3 and page 4, lines 31-58.

distance below the top of said first portion of said purification material, wherein said temperature sensor is placed within a melt zone.

WO 99/19048 discloses a similar getter vessel having a temperature sensor disposed in a first portion of a purification material, wherein said temperature sensor is located a distance below the top of said first portion of said purification material, wherein said temperature sensor is placed within a melt zone in Fig. 3, page 2, line 11 to page 3, line 3, and page 9, line 24 to page 10, line 11.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the temperature sensor placed in the melt zone of the purification material of WO 99/19048 into the vessel of GB 2 177 079 A to rapidly detect the onset of an exothermic reaction which indicates the presence of excess impurities in the incoming gas to be purified, as suggested by WO 99/19048 in page 2, lines 26-29.

With regard to claim 28, UK Patent Application GB 2 177 079 A discloses the gas purification material comprising a non-evaporative getter alloy of zirconium-vanadium-iron in page 2, lines 4-11.

With regard to claim 29, UK Patent Application GB 2 177 079 A discloses the quantity of barrier material including a quantity of stainless steel shot in page 4, lines

With regard to claim 31, UK Patent Application GB 2 177 079 A and WO 99/19048 do not disclose the temperature sensor being operable to detect a temperature rise of 10 degrees per millisecond.

Temperature sensors having different response rates are well known in the art.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate a temperature sensor having the appropriate response rate to insure that the temperature reported by the sensor is accurate, as is well known in the art.

With regard to claims 39-41, WO 99/19048 discloses the temperature sensor being a resistance temperature device (RTD) which includes platinum, a thermistor, and a thermocouple in page 8, lines 5-9.

With regard to claims 42 and 43, WO 99/19048 discloses the distance being calculated from a flow rate or the age of the first portion of getter purification material in page 10, lines 12-20.

With regard to claim 44, WO 99/19048 discloses the distance being between 0 and 3 inches below the top surface of first quantity of getter in page 10, lines 12-20.

Since the claimed range is seen as lying with the prior art range, a prima facie case of obviousness exists which must be overcome through a showing of unexpected or unobvious results.

25. Claims 22-25 are rejected under 35 U.S.C. 103(a) as being unpatentable over UK Patent Application GB 2 177 079 A and WO 99/19048 as applied to claim 21 above, and further in view of Goldstein.

With regard to claim 22, UK Patent Application GB 2 177 079 A discloses a heated getter vessel wherein the gas heating device includes a gas heater body (top of 3), a heat source (6), a gas passage (1), a first annular volume (3), and a second annular volume (16), wherein said gas heater body, said gas passage, said first annular volume, and said second annular volume are arranged within said getter vessel (3) such that the gas heater body defines said first and second annular volumes, said gas passage is in fluid communication with said inlet and said first annular volume, said first annular volume is in fluid communication with said second annular volume, said second annular volume is in fluid communication with an internal volume defined by said getter vessel enclosure, such that a gas flowing into said enclosure via said inlet flows from said inlet through said gas passage, then through said first annular volume, then through said second annular volume and exits said gas heating device into said getter

UK Patent Application GB 2 177 079 A and WO 99/19048 do not disclose the heated getter vessel having a plurality of gas passages.

Goldstein discloses a similar getter vessel having a plurality of gas passages (180) in Fig. 1.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the plurality if gas passages of Goldstein into the getter vessel of UK Patent Application GB 2 177 079 A and WO 99/19048 to more evenly distribute the gas entering the vessel to ensure even heating of the gas, as is well known in the art.

With regard to claim 23, UK Patent Application GB 2 177 079 A discloses the heat source including a plurality of heat sources (6,21) in Fig. 3.

Furthermore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to duplicate the heating element (6) of UK Patent Application GB 2 177 079 A in that duplicating parts for a multiplied effect is merely a choice of design. See St. Regis Paper Co. v. Bemis Co., Inc., 193 USPQ 8, 11.

With regard to claim 24, UK Patent Application GB 2 177 079 A discloses at least one heat source (6) being in contact with at least a portion of the gas heater body (14) in Fig. 3.

With regard to claim 25, UK Patent Application GB 2 177 079 A discloses at least one heat source (6,21) being in contact with at least a portion of the getter vessel enclosure (3,14) in Fig. 3.

26. Claims 26, 27, and 32 are rejected under 35 U.S.C. 103(a) as being unpatentable over UK Patent Application GB 2 177 079 A and WO 99/19048 as applied to claim 21 above, and further in view of Carrea et al.

With regard to claims 26 and 27, UK Patent Application GB 2 177 079 A and WO 99/19048 do not disclose the gas purification material including a plurality of types of gas purification material or the gas purification material being selected from the group consisting of zirconium, palladium, platinum, rhodium, ruthenium, nickel, titanium, and alloys thereof.

Carrea et al. discloses a similar getter vessel having a plurality of types of gas purification materials (34,38) including a titanium alloy in Fig. 2 and col. 4, lines 8-46.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the plurality of purification materials including the titanium/nickel alloy into the vessel of GB 2 177 079 A and WO 99/19048 to allow several different gasses to be adsorbed, including hydrogen, methane, water, carbon monoxide, nitrogen, oxygen, and carbon dioxide, as suggested by Carrea et al. in col. 4,

With regard to claim 32, UK Patent Application GB 2 177 079 A and WO 99/19048 do not disclose the getter vessel further comprising an outlet filter proximal to the outlet of said getter vessel.

Carrea et al. discloses a similar getter vessel having an outlet filter (22) proximal to the outlet of said getter vessel in Fig. 1 and col. 3, lines 35-37.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the outlet filter of Carrea et al. into the getter vessel of UK Patent Application GB 2 177 079 A and WO 99/19048 to remove any particles present in the gas flow, as suggested by Carrea et al. in col. 3, lines 35-37

27. Claim 33 is rejected under 35 U.S.C. 103(a) as being unpatentable over UK Patent Application GB 2 177 079 A, WO 99/19048, and Carrea et al. as applied to claim 32 above, and further in view of Snow et al.

UK Patent Application GB 2 177 079 A, WO 99/19048, and Carrea et al. do not disclose the outlet filter being a sintered stainless steel or sintered nickel filter.

Snow et al. discloses a similar outlet filter being a sintered nickel filter having a disk shape in col. 2, lines 3-28.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the metal filter of Snow et al. into the vessel of UK Patent Application GB 2 177 079 A, WO 99/19048, and Carrea et al. to prevent

28. Claim 34 is rejected under 35 U.S.C. 103(a) as being unpatentable over UK Patent Application GB 2 177 079 A, WO 99/19048, and Carrea et al. as applied to claim 32 above, and further in view of Davis.

UK Patent Application GB 2 177 079 A, WO 99/19048, and Carrea et al. do not disclose the outlet filter including a disk shaped filter or a cylindrical shaped filter.

Davis discloses a similar filtering element having a disk shape in col. 5, lines 26-28.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the disk shaped filter element of Davis into the vessel of GB 2 177 079 A, WO 99/19048, and Carrea et al. to allow the filter elements to be economically housed within a standard cylindrical vessel.

29. Claim 35 is rejected under 35 U.S.C. 103(a) as being unpatentable over UK Patent Application GB 2 177 079 A in view of WO 99/19048.

UK Patent Application GB 2 177 079 A discloses a method for purifying a gas comprising heating a gas with a heating device (6), contacting said heated gas to a quantity of gas purification material (4), wherein said gas purification material is operative to substantially remove impurities from said heated gas, and providing a barrier layer (15), wherein said barrier layer has a quantity of barrier material operative to react with a portion of said gas purification material in Fig. 3 and page 4, lines 31-58.

a combination thereof, providing a temperature sensor at a distance from the top of a first portion of said quantity of gas purification material, in such a manner that said temperature sensor falls within said melt zone, or measuring said heated gas temperature utilizing the temperature sensor.

WO 99/19048 discloses a similar method including determining a melt zone based on either a flow rate of the gas or an age of the gas purification material or a combination thereof, providing a temperature sensor at a distance from the top of a first portion of said quantity of gas purification material, in such a manner that said temperature sensor falls within said melt zone, or measuring said heated gas temperature utilizing the temperature sensor in Fig. 3, page 2, line 11 to page 3, line 3, and page 9, line 24 to page 10, line 20.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the temperature sensor placed in the melt zone of the purification material of WO 99/19048 into the method of GB 2 177 079 A to rapidly detect the onset of an exothermic reaction which indicates the presence of excess impurities in the incoming gas to be purified, as suggested by WO 99/19048 in page 2, lines 26-29.

30. Claims 36-38 is rejected under 35 U.S.C. 103(a) as being unpatentable over UK Patent Application GB 2 177 079 A in view of Carrea et al., Snow et al., and WO

With regard to claim 36, UK Patent Application GB 2 177 079 A discloses a gas purification system comprising a heated getter vessel having an inlet (1), an outlet (2), and a heat source (6) in Fig. 3 and page 4, lines 31-58.

UK Patent Application GB 2 177 079 A does not disclose the gas purification system comprising a system inlet and a system outlet, a gas to gas heat exchanger having a cool gas inlet, a preheated gas outlet, a heated gas inlet, and a precooled gas outlet, a gas to air heat exchanger having a precooled gas inlet and a cooled gas outlet, an integrated hydrogen sorption and particle filter having an inlet and an outlet, said system inlet in fluid communication with said cool gas inlet on said gas to gas heat exchanger, said preheated gas outlet on said gas to gas heat exchanger in fluid communication with said inlet on said heated getter vessel, said outlet on said heated getter vessel in fluid communication with said heated gas inlet on said gas to gas heat exchanger, said precooled gas outlet on said gas to gas heat exchanger in fluid communication with said inlet on said precooled gas inlet on said gas to air heat exchanger, said cooled gas outlet on said gas to air heat exchanger in fluid communication with said inlet on said integrated hydrogen sorption and particulate filter, said outlet on said integrated hydrogen sorption and particle filter in fluid communication with said system outlet, or at least one temperature sensor being placed within said heated getter vessel, such that said at least one temperature sensor is located within a melt zone of said first quantity of said gas purification material.

(14) having a cool gas inlet (12), a preheated gas outlet (12), a heated gas inlet (18), and a precooled gas outlet (18), a gas to air heat exchanger (20) having a precooled gas inlet (18) and a cooled gas outlet (not numbered, upstream of 22), a particle filter (22) having an inlet and an outlet, said system inlet (10) in fluid communication with said cool gas inlet (12) on said gas to gas heat exchanger, said preheated gas outlet (12) on said gas to gas heat exchanger in fluid communication with said inlet (12) on said heated getter vessel, said outlet (18) on said heated getter vessel in fluid communication with said heated gas inlet (18) on said gas to gas heat exchanger, said precooled gas outlet (18) on said gas to gas heat exchanger in fluid communication with said inlet (18) on said precooled gas inlet on said gas to air heat exchanger (20), said cooled gas outlet (not numbered, upstream of 22) on said gas to air heat exchanger in fluid communication with said inlet on said particulate filter (22), or said outlet on said particle filter (22) in fluid communication with said system outlet in Fig. 1 and col. 3, lines 20-44.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the heat exchangers of Carrea et al. into the system of UK Patent Application GB 2 177 079 A to recover the heat in the gas stream exiting the heated getter vessel to preheat the gas stream entering the heated getter vessel to reduce the amount of energy required to heat the gas entering the getter vessel and to reduce the amount of cooling required for the heated gas stream exiting the getter

UK Patent Application GB 2 177 079 A and Carrea do not disclose the filter being an integrated hydrogen sorption and particle filter.

Snow et al. discloses a similar filter being an integrated hydrogen sorption and particle filter in col. 2, lines 3-53 and col. 4, lines 15-35.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the integrated hydrogen sorption and particle filter of Snow et al. into the system of UK Patent Application GB 2 177 079 A and Carrea to ensure that contaminant gases and particles are prevented from escaping into downstream processing, as suggested by Snow et al. in col. 3, line 63 to col. 4, line 14.

WO 99/19048 discloses a similar system having at least one temperature sensor placed within said heater getter vessel, such that said at least one temperature sensor is located within a melt zone of said first quantity of said gas purification material in Fig. 3, page 2, line 11 to page 3, line 3, and page 9, line 24 to page 10, line 20.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the temperature sensor placed in the melt zone of the purification material of WO 99/19048 into the system of GB 2 177 079 A to rapidly detect the onset of an exothermic reaction which indicates the presence of excess impurities in the incoming gas to be purified, as suggested by WO 99/19048 in page 2, lines 26-29.

purification material (4), a quantity of barrier material (15), an enclosure (3,14) having an inlet (1) and an outlet (2), said enclosure housing said gas purification material and said gas heating device, said gas heating device proximal to the inlet, said barrier material proximal to the outlet, said gas purification material disposed between said gas heating device and said barrier material, said gas heating device, gas purification material, and said barrier material arranged within said enclosure such that a gas flowing into said enclosure via said inlet and out of said enclosure via said outlet must follow a flow path first through said gas heating device then contacting said gas purification material then flowing through said barrier material in Fig. 3 and page 4, lines 31-58.

With regard to claim 38, Snow et al. discloses a gas purification providing hydrogen sorption and particulate filtering comprising a hydrogen sponge (90) including hydrogen sorption material, a particulate filtering device (100), and an enclosure having an inlet and an outlet, said enclosure housing said hydrogen sponge and said particulate filter device, said hydrogen sponge proximal to said inlet, said filter device proximal to said outlet, said hydrogen sponge and said particulate filter device arranged within said enclosure such that a gas flowing into said enclosure via said inlet and out of said enclosure via said outlet must follow a flow path first contacting said hydrogen sorption material and then flowing through the particulate filtering device in Figs. 2(d)

Conclusion

31. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

32. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jason M. Greene whose telephone number is (703) 308-6240. The examiner can normally be reached on Tuesday - Friday (7:00 AM to 5:30 PM).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's

872-9310 for regular communications and (703) 872-9311 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0661.

Jason M. Greene
Examiner
Art Unit 1724

jmg
June 26, 2002